IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application for:	Examiner: Freshteh N. Aghdam
Daniel Yellin, et al.	Art Unit: 2611
Application No.: 10/734,117	Confirmation No.: 4852
Filed: December 15, 2003	
For: A FILTER FOR A MODULATOR AND METHODS THEREOF	

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Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

APPELLANTS' APPEAL BRIEF

TO THE HONORABLE COMMISSIONER FOR PATENTS:

This brief is in support of a Notice of Appeal to the Board of Patent Appeals and Interferences filed on March 15, 2010, appealing the decision of the Examiner in the Office Action mailed December 23, 2009 (hereinafter "Office Action"), in which the claims of the above-captioned application were rejected. Appellants respectfully request consideration of this Appeal by the Board of Patent Appeals and Interferences ("BPAI") for allowance of the present patent application.

I. REAL PARTY IN INTEREST

The real party in interest in the above-identified application is Marvell International Ltd. by virtue of an assignment recorded in the U.S. Patent Office on December 14, 2006, at reel no. 018633, frame no. 0160.

II. RELATED APPEALS AND INTERFERENCES

Appellants' undersigned representative and the assignee identified above are not aware of any other appeals or interferences that would directly affect or be directly affected by, or have a bearing on the BPAI's decision in the subject appeal.

III. STATUS OF CLAIMS

Claims 1-25, 27-33 and 36-38 are cancelled.

Claims 26, 34-35 and 39-40 were previously presented. An Amendment is being filed concurrently herewith to correct typographical errors in claims 26 and 39. The claim listing in Appendix VIII of this Appeal Brief reflects the claims as amended in the concurrently filed Amendment.

Claims 26, 34-35 and 39-40 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,101,224 ("Lindoff") in view of U.S. Patent Publication No. 2004/0041638 ("Vilcocq") and U.S. Patent Publication No. 2003/0123566 ("Hasson").

Appellants respectfully traverse and appeal the rejection of claims 26, 34-35 and 39-40.

IV. STATUS OF AMENDMENTS

An Amendment is being filed concurrently herewith to correct a typographical error in claims 26 and 39. No other Amendments have been filed subsequent to the Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claims 26, 34-35 and 39-40 are directed to a communication device. Support for the claims can be found throughout the specification as originally filed. A summary of independent claim 26, which is subject to this appeal, is set forth below.

Independent claim 26 is directed to a communication device comprising a baseband symbol generator, a dipole antenna and a power amplifier coupled to the dipole antenna. The power amplifier is configured to receive a first output of the baseband symbol generator from a signal path that includes a fractional-N sigma-delta modulator having a pre-emphasis filter, to receive a second output of the baseband symbol generator, and to amplify the first output with a gain that is controlled by a varying amplitude of the second output. The fractional-N sigma-delta modulator includes at least a sigma-delta converter coupled to the pre-emphasis filter and a fractional-N phase locked loop unit coupled to an output of the sigma-delta converter. A transfer function of the pre-emphasis filter is optimized according to predefined optimization criteria, where the optimization criteria are related to an input to the pre-emphasis filter and are related to an input to a voltage controlled oscillator of the fractional-N phase locked loop unit.

At least FIGs. 1-2 and 4, and respective discussion on pg. 3, ¶s [0013-0015], pg. 4, ¶ [0017], and pg. 7, ¶s [0037-0038] describe embodiments of a communication device that support independent claim 26. For example, FIG. 1 is a block-diagram illustration of a communication system 100 that includes a transmitter 106 and an antenna 108. In a described embodiment, the antenna 108 is a dipole antenna. The transmitter 106 includes a base band symbol generator 114 and a fractional-N sigma-delta modulator 120.

FIG. 2 is a block-diagram illustration of the fractional-N sigma-delta modulator 120. A digital portion of the fractional-N sigma-delta modulator 120 includes a filter 204 such as, for example, a pre-emphasis filter. The fractional-N sigma-delta modulator 120 also includes a sigma-delta converter 210. An analog portion of the fractional-N sigma-delta modulator implements an analog phase locked loop (PLL) 212. The analog portion also includes a voltage controlled oscillator (VCO) 224.

FIG. 4 is a block diagram of a fractional-N sigma-delta modulator example 420 that includes an adaptive filter 404 such as, for example, an adaptive pre-emphasis filter. Adaptive algorithm 403 compares the input to filter 204 (the instantaneous frequency *W*) to the input to VCO 224 (after digitization). Adaptive algorithm 403 adapts filter 204 according to the comparison.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Rejection under 35 U.S.C. § 103(a)

Whether claims 26, 34-35 and 39-40 are unpatentable over Lindoff in view of Vilcocq and Hasson.

VII. ARGUMENTS

Rejection under 35 U.S.C. § 103(a)

Whether claims 26, 34-35 and 39-40 are unpatentable over Lindoff in view of Vilcocq and Hasson.

In the Office Action, the Examiner directs "the Applicant's attention to the fact that the most important aspect of the claimed invention is the fact that the coefficients of the pre-emphasis filter is adaptive rather than predetermined, which this feature is taught by Vilcocq. The only difference between the claimed invention and the prior art is that, according to the claimed invention, the optimization criteria are related to the input to the VCO but Vilcocq teaches the optimization criteria are related to the output to the VCO. One of ordinary skill in the art would readily recognize that it is well known in the art, obvious, and/or a matter of design choice for the coefficients of the pre-emphasis filter be obtained from the input to the VCO rather than the output to the VCO, wherein when the optimization criteria are based on the output to the VCO then the optimization process would be more accurate than when only the input to the VCO is being considered. On the other hand, when the optimization criteria are based on only the

input to the VCO then hardware complexity is reduced due to computational simplicity." (Office Action dated December 23, 2009, page 4, first paragraph).

Appellants strongly disagree with this mischaracterization of the present invention. According to MPEP 2143, "[T]he Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1395-97 (2007) identified a number of rationales to support a conclusion of obviousness which are consistent with the proper "functional approach" to the determination of obviousness as laid down in *Graham*. The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit."

MPEP 2143 goes on to state:

> Exemplary rationales that may support a conclusion of obviousness include:
>
> (A) Combining prior art elements according to known methods to yield predictable results;
>
> (B) Simple substitution of one known element for another to obtain predictable results;
>
> (C) Use of known technique to improve similar devices (methods, or products) in the same way;
>
> (D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
>
> (E) "Obvious to try" - choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
>
> (F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;
>
> (G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. [Emphasis added]

The Examiner has not pointed to any teaching, suggestion, or motivation in the prior art that would have lead one of ordinary skill to modify Vilcocq. The Applicants respectfully submit that Examiner's failure is not surprising, because there is no such teaching, suggestion or motivation in the prior art. The Examiner has superficially reached a conclusion that "it is well known in the art, obvious, and/or a matter of design choice for the coefficients of the pre-emphasis filter be obtained from the input to the VCO rather than the output to the VCO, wherein when the optimization criteria are based on the output to the VCO then the optimization process would be more accurate than when only the input to the VCO is being considered. On the other hand, when the optimization criteria are based on only the input to the VCO then hardware complexity is reduced due to computational simplicity." Appellants respectfully submit if the Examiner were correct, the Examiner would have had no problem citing a prior art reference to support his conclusions and additionally provide an explicit analysis, as opposed to mere conclusions, to support his 103 rejection, as required by *KSR*.

Independent claim 26 is directed to a communication device, comprising, among other features:

> … a fractional-N sigma-delta modulator having a pre-emphasis filter,
> wherein a transfer function of said pre-emphasis filter is to be optimized according to predefined optimization criteria; and
> wherein said optimization criteria are related to an input to said pre-emphasis filter and are related to an input to a voltage controlled oscillator of the fractional-N phase locked loop unit.

In contrast, Vilcocq discloses a digital modulation synthesizer, comprising a pre-accentuation filter 18 which receives the frequency modulation signal F_{mod} at one input. See Vilcocq, FIG. 2, para. [0026]. The second input to the pre-accentuation filter 18 is connected to the output of the voltage controlled oscillator via an auxiliary loop comprising means 20 for demodulating the output signal S_{out}, an analog/digital converter 25, and a calculation unit 26. See id., para. [0052].

Vilcocq does not teach or suggest "optimization criteria [that] are related to an input to said pre-emphasis filter and are related to an input to a voltage controlled oscillator of the fractional-N phase locked loop unit" as claimed. As the Examiner concedes, the pre-accentuation filter disclosed in Vilcocq is related to an output of a

voltage controlled oscillator, rather than to an input of a voltage controlled oscillator. See Final Office Action, page 6, first paragraph.

MPEP 2143.01 states "If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)"

Vilcocq proposes a pre-accentuation filter having a transfer function defined judiciously so that the determining coefficient depends on the open-loop gain of the PLL. See Vilcocq, para. [0013]. Specifically, the value of the determining coefficient is a function of a parameter of quality of the modulation of the output signal of the synthesizer. This parameter is preferably the phase error in the output signal when this signal is phase-modulated or the frequency error when this signal is frequency-modulated. See id. As such, in Vilcocq, the pre-accentuation filter has to be related to the output of a PLL in order to compensate for the quantization noise, including phase error or frequency error, introduced by the modulation process. See id., para. [0005-0006]. This is contrary to the recitations of claim 26.

In Vilcocq, having the pre-accentuation filter be related to the output of the PLL, rather than the input of the VCO, is not merely a simple matter of design choice as asserted by the Examiner, but rather dictated by the fact that the transfer function of the pre-accentuation filter is determined by the open-loop gain of the PLL. Instead of teaching or suggesting the communication device as claimed, Vilcocq actually teaches away from the claimed device.

In sum, Vilcocq fails to provide any teaching, suggestion, or motivation to indicate that claim 26 would be obvious to one skilled in the art at the time the invention as claimed was made. Indeed, modifying Vilcocq to read on claim 26 would be a modification "of the prior art [that] would change the principle of operation of the prior art invention being modified." Therefore, claim 26 is allowable over Vilcocq.

Lindoff discloses an apparatus to generate a linearly modulated signal in a polar modulation system. See Lindoff, Abstract. Hasson discloses a transmitter including a switching amplifier and a sigma-delta N-PSK modulator. See Hasson, Abstract. Neither Lindoff nor Hasson, either alone or in combination, teach or suggest

optimization criteria which are related to an input to a pre-emphasis filter and are related to an input to a voltage controlled oscillator of the fractional-N phase locked loop unit as calimed. In view of the foregoing, there is no teaching, suggestion, or motivation to indicate that such feature would be obvious to one skilled in the art at the time the invention as claimed was made. Accordingly, claim 26 is allowable over Vilcocq even further in view of Lindoff and Hasson.

Claims 34-35 and 39-40 depend on claim 26, either directly or indirectly, thereby incorporating all recitations of claim 26. Therefore, claims 34-35 and 39-40 are also allowable over Vilcocq in view of Lindoff and Hasson.

CONCLUSION

Appellants respectfully submit that all the appealed claims in this application are patentable and requests that the Board of Patent Appeals and Interferences direct allowance of the rejected claims. Payment to cover the appeal fee has been made by Deposit Account. We do not believe any other fees are needed. However, should any other fees be necessary, please charge our Deposit Account No. 500393. In addition, please credit any overages to the same account.

Respectfully submitted,
Schwabe, Williamson & Wyatt, P.C.

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VIII. CLAIMS APPENDIX

26. A communication device comprising:

a baseband symbol generator;

a dipole antenna; and

a power amplifier coupled to said dipole antenna, the power amplifier being configured to receive a first output of said baseband symbol generator from a signal path that includes a fractional-N sigma-delta modulator having a pre-emphasis filter, to receive a second output of the baseband symbol generator, and to amplify the first output with a gain that is controlled by a varying amplitude of the second output;

wherein said fractional-N sigma-delta modulator includes at least:

a sigma-delta converter coupled to the pre-emphasis filter; and

a fractional-N phase locked loop unit coupled to an output of said sigma-delta converter,

wherein a transfer function of said pre-emphasis filter is to be optimized according to predefined optimization criteria, and

wherein said optimization criteria are related to an input to said pre-emphasis filter and are related to an input to a voltage controlled oscillator of the fractional-N phase locked loop unit.

34. The communication device of claim 26, wherein said transfer function of said pre-emphasis filter is a finite impulse response.

35. The communication device of claim 26, wherein said optimization criteria includes a mean squared error of said input to said pre-emphasis filter and the input to a voltage controlled oscillator of said fractional-N phase locked loop unit.

39. The communication device of claim 26, further comprising:

an adaptive filter to compare said input to said pre-emphasis filter and said input to said voltage controlled oscillator and to adapt the optimization criteria in accordance with a result of said comparison.

40. The communication device of claim 39, wherein said adaptive filter includes an analog-to-digital (A/D) converter coupled to said input to said voltage controlled oscillator.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.